

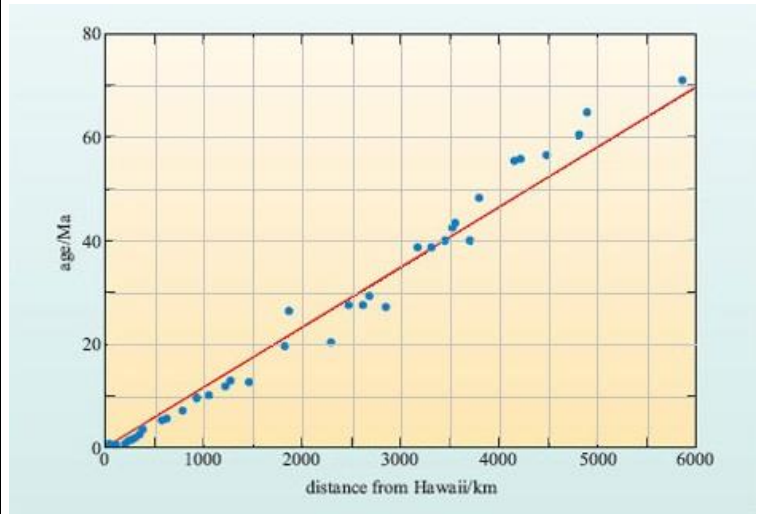
Dynamic Planet Test

Answers must be shaded-in or written on the supplied answer sheet;

Section A: Multiple choice 1-61 (1 pt each) • Free response 62-75 (2 pts each)

- The presence, location, and size of the solid inner core was detected/described using:
 - P-waves
 - S-waves
 - L - waves
 - microwaves
 - water waves
- Beneath Earth's lithosphere, the hotter, weaker zone that allows for motion on Earth's rigid outer shell is called:
 - core
 - asthenosphere
 - rust
 - D-layer
 - Moho
- New oceanic crust is created at:
 - transform plate boundaries
 - subduction zones
 - mid-ocean ridges
 - convergent plate boundaries
 - volcanoes
- Mount Everest, the highest mountain on earth, is made of marine limestone and is part of the Himalaya mountain chain. The elevation of the limestone to such a great height is primarily the result of:
 - subduction
 - rifting
 - continent-continent convergence
 - spreading at a mid-ocean ridge
 - hot spot volcanism

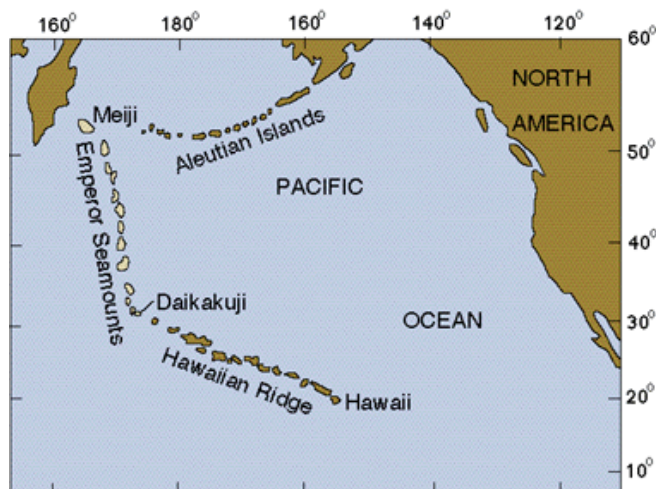
- Graph shows age of seamount/island chain vs distance from Hawaii measured along the Hawaii-Emperor chain of islands and seamounts. A best-fit line has been drawn through the data.



Estimate the average rate in mm/y at which volcanic activity has appeared to move along the Hawaiian-Emperor Seamount Chain.

- 8.8 mm/y
 - 88 mm/y
 - 880 mm/y
 - 8,800 mm/y
 - 880,000 mm/y
- The oceanic crust is primarily made up of this basic type of rock
 - Basalt
 - Limestone
 - Granite
 - Sandstone
 - Lignite

7. Based on the answer to the previous question, and figure below, determine overall direction in which the active volcanism has moved

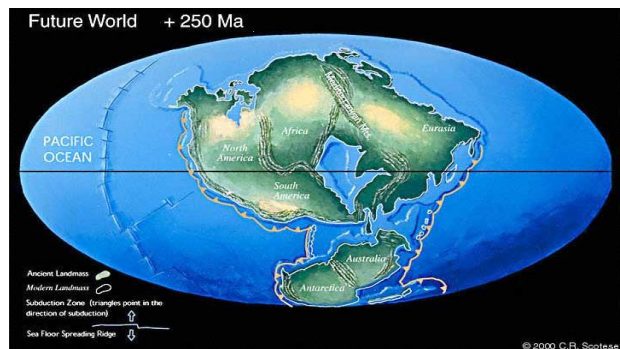


- A. West then North
 B. East then South
 C. West then North
 D. South then Southeast
 E. Northwest then North
8. Determine the direction the plate has moved
- A. West then North
 B. East then South
 C. West then North
 D. South then Southeast
 E. Northwest then North
9. A group of related rocks that formed together in one area, do not show any relationship to the other rocks around them, and are separated from the rocks around them by faults is called a(n)...
- A. Craton
 B. Subsidence zone
 C. Alluvial fan
 D. Basin
 E. Terrane

10. Which one of the following cannot be used as evidence to support the theory of continental drift?
- A. Jig-saw fit of opposing continental coastlines
 B. Trends of ancient fold mountain belts
 C. Geological match of rocks on opposing continental coastlines
 D. Glacial deposits
 E. Radiometric dating
11. The theory of sea floor spreading was developed by an American geophysicist in 1962. What was his name?
- A. Harry Hill
 B. Harry Hess
 C. Drummond Matthews
 D. Tuzo Wilson
 E. Dan McKenzie
12. Which mineral in the oceanic lithosphere has been used to determine the polarity of the Earth's magnetic field through geological time?
- A. Augite
 B. Feldspar
 C. Magnetite
 D. Iron Pyrite
 E. Olivine
13. Hot spots under the continental lithosphere generally create _____ while those under oceanic lithosphere commonly create _____.
- A. shield volcanoes, stratovolcanoes
 B. cinder cones, stratovolcanoes
 C. calderas, stratovolcanoes
 D. cinder cones, shield volcanoes
 E. calderas, shield volcanoes

14. California's San Andreas Fault is identified as which of the following?
- A. Blind thrust fault
 - B. Dip-slip fault
 - C. Normal fault
 - D. Strike-slip fault
 - E. Reverse fault
15. The driving force behind all mass wasting processes is
- A. Gravity
 - B. slope angle
 - C. type of bedrock material
 - D. presence of water
 - E. vegetation
16. Where do accretionary wedges form?
- A. Above subduction zones
 - B. In deep ocean basins
 - C. In mountain tope
 - D. In rift valleys
 - E. On passive continental margins
17. What marks the boundary between the Earth's crust and mantle?
- A. Lehmann-Bullen Discontinuity
 - B. Gutenberg Discontinuity
 - C. Conrad Discontinuity
 - D. Mohorovicic Discontinuity
 - E. There is no boundary
18. Which concept describes the process of crustal rocks resting in gravitational balance on top of denser rocks?
- A. orogenesis
 - B. tension
 - C. dip-slip
 - D. isostasy
 - E. none of the above
19. Which of the following processes is not an important cause of subsidence during the development of a sedimentary basin?
- A. cooling and contraction of the crust
 - B. deposition of sediments
 - C. erosion of sediments
 - D. tectonic down faulting
 - E. tectonic loading
20. Pangaea, in early geologic time, a supercontinent that incorporated almost all the landmasses on Earth, was surrounded by a global ocean called
- A. Gondwana
 - B. Arctica
 - C. Atlantica
 - D. Cimmeria
 - E. Panthalassa
21. An orogenic event directly creates
- A. mountains
 - B. abyssal plains
 - C. craton
 - D. sinkholes
 - E. a supercontinent
22. The geologic history of the North American craton can be divided into two parts:
- A. Greenstone belt development and accretion
 - B. Mountain building and shallow transgressive and regressive seas
 - C. Transgressive and regressive mountain building
 - D. Deep ocean basins and granite magmatism
 - E. None of the above

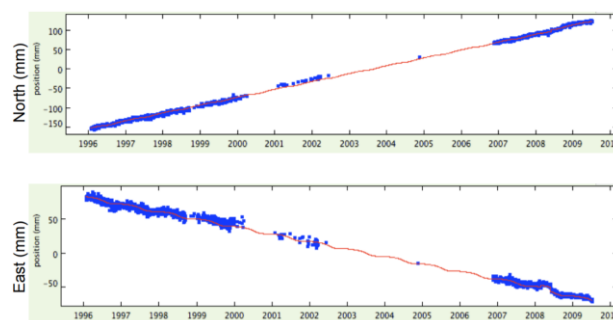
23. Picture shows the future geology of earth. What is this called?



- A. Anthropocene
B. Pangea
C. Pangea Ultima
D. Neozoic
E. Protozoa
24. Which best describes the circumstances by which “gravitational collapse” occurs?
- A. As the mountain is being built by collision, the lesser the downward force on the base of the mountain, causing horizontal escape of the base rocks.
B. As the mountain erodes away, the greater the downward force on the base causing horizontal escape of the base rocks.
C. The higher the mountain, the greater the downward force on the base causing horizontal escape of the base rocks.
D. The lower the mountain, the lesser the downward force on the base causing horizontal escape of the base rocks
E. none of the above
25. Which of the following can trigger a tsunami?
- A. undersea earthquakes
B. undersea landslides
C. the eruption of an oceanic volcano
D. all the above
E. none of the above

26. According to the idea of “isostatic adjustment,” what would happen if a weight is added to the top of the crust?
- A. It will respond by uplifting the crust higher
B. It will have no effect on the crust at all
C. It will respond by sinking the crust downward
D. It will force the crust into the mantle to start a subduction zone
E. None of the above
27. Which plate boundary has **NO** earthquakes?
- A. Divergent
B. Convergent
C. Transform
D. All of the above
E. None of the above

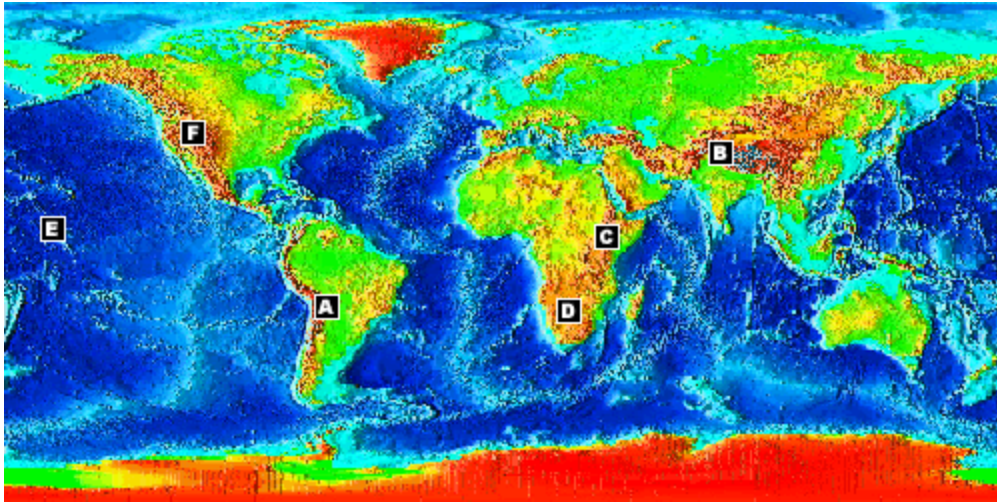
Below is the GPS time series plot for REYK GPS station



28. What direction is HOFN moving?
- A. North
B. East
C. Northeast
D. Northwest
E. Not enough information to interpret
29. Approximately, how fast was REYK moving over a period of 10 years from 1998 to 2008 in mm/yr?
- A. 43750 mm/yr
B. 2326 mm/yr
C. 1225 mm/yr
D. 145 mm/yr
E. 23 mm/yr

30. Which of these is an instrument NOT used to measure a tsunami?
- A. Seismograph
 - B. Ocean buoys
 - C. Tide gauge
 - D. Barometer
 - E. Satellite altimetry
31. Hot seawater in hydrothermal vents does not boil because
- A. it's mixed with minerals
 - B. temperature is below boiling point
 - C. magma that heats the seawater is not hot enough
 - D. seawater cannot boil
 - E. of the extreme pressure at the depths
32. What kind of rock makes up the Yellowstone Plateau?
- A. Granite
 - B. Basalt
 - C. Andesite
 - D. Sandstone
 - E. Rhyolite
33. The occurrence of geysers in Yellowstone National Park is evidence for the presence of?
- A. melted rock
 - B. radioactive materials
 - C. diamonds
 - D. the asthenosphere
 - E. carbon dioxide
34. The production of magma is favored by an increase in _____ and _____, and a decrease in _____.
- A. pressure, water content, heat
 - B. pressure, heat, water content
 - C. heat, water content, pressure
 - D. solar heat, water content, pressure
 - E. solar heat, pressure, water content
35. Mountain-building activity in the present-day Rocky Mountains occurred during this phase of the Cordilleran orogeny:
- A. Sonoma
 - B. Laramide
 - C. Nevadan
 - D. Sevier
 - E. None of the above
36. Earthquake A has a Richter magnitude of 7 as compared with earthquake B's 6. Considering ground motion as a measure,
- A. A is 10 times more intense than B
 - B. A is 30 times more intense than B
 - C. A is 1000 times more intense than B
 - D. Richter magnitude does not measure intensity
 - E. B is 0.01 times as intense than A
37. The orogenies that made the Appalachian Mountains along the eastern United States occurred because of
- A. Transform faulting
 - B. Ocean-ocean collision
 - C. Oceanic-continent collision
 - D. Continent-continent collision
 - E. None of the above
38. Which of these features must be present for a hydrothermal vent to form at a subduction zone?
- A. Fine grained minerals
 - B. Ocean-continent collision
 - C. Transform fault
 - D. Low pressure
 - E. seawater percolating down through fissures in the ocean crust

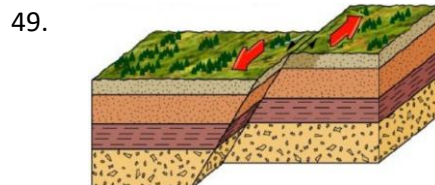
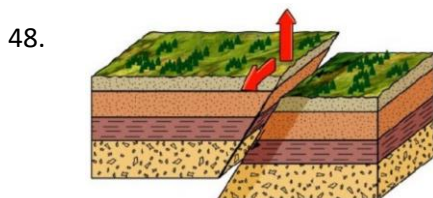
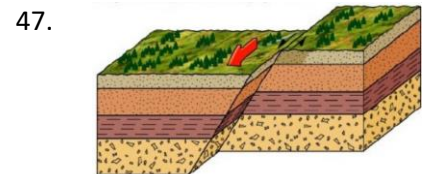
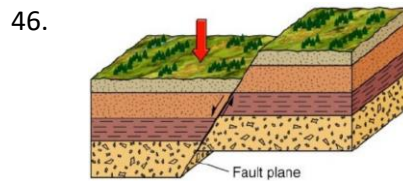
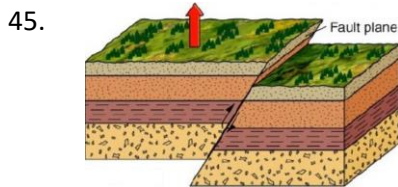
Identify the method of formation of each of the indicated mountain belts by selecting the correct letter response.



39. mantle upwelling
40. hot-spot volcanoes in an oceanic plate
41. ocean-continent arc formation
42. fault-block mountains and rift volcanic mountains
43. continent-continent collision
44. fault-block mountains

Following are types of faults, causes and attributes. Use the letter from the word bank that matches the picture in the answer sheet and fill the table in the answer sheet

Faults	Boundary	Force	Movement
A. Normal	A. Convergent	A. Compression	A. Vertical, dip angle 60 degrees
B. Reverse	B. Divergent	B. Tension	B. Horizontal, dip angle 30 degrees
C. Strike-Slip	C. Transform	C. Shear	C. Horizontal, Lateral movement
D. Transform		D. Lateral stress	D. Horizontal and vertical
E. Oblique		E. Shear and compression/tension	E. Horizontal



Following are types of mass wasting, speed of process, and nature of motion. Shade the letter from word bank to match it to the picture and fill the table in the answer sheet.

Type	Speed of Process	Force
A. Solifluction	A. Slow	A. Fall
B. Mudflow	B. Moderate	B. Flow
C. Slump	C. Fast	C. Slide
D. Rockslide		
E. Creep		
F. Landslide		

50.



51.



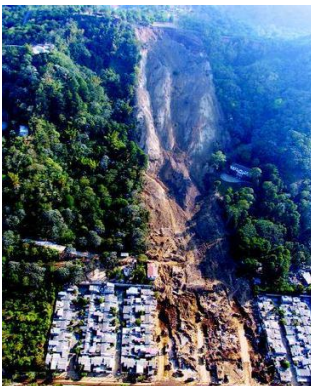
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53.



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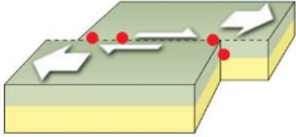
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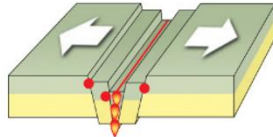
For each of the following questions, identify the plate boundary type and the plates (oceanic/continental)

- Shallow focus earthquakes (0–69 km)
- Intermediate focus earthquakes (70–299 km)
- Deep focus earthquakes (300–700 km)
- 🔥 Magma or lava (molten rock)

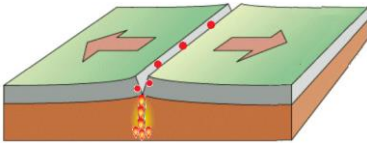
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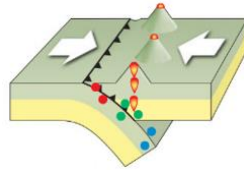
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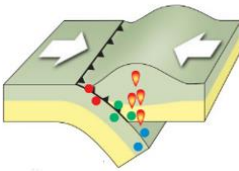
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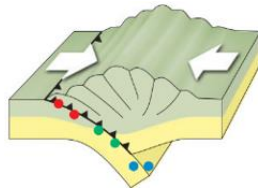
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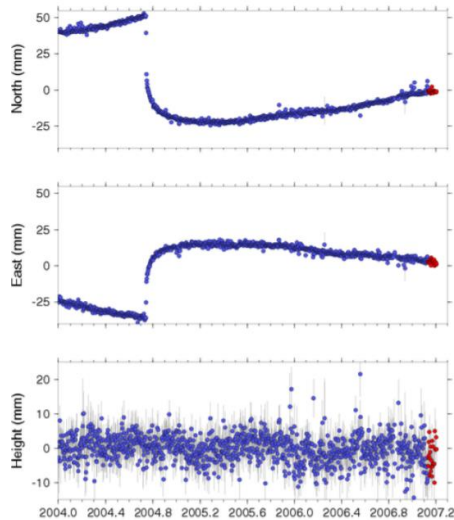
60.



61.



Below is a GPS time series plot of a GPS station



62. What happened at the place where the station is located?

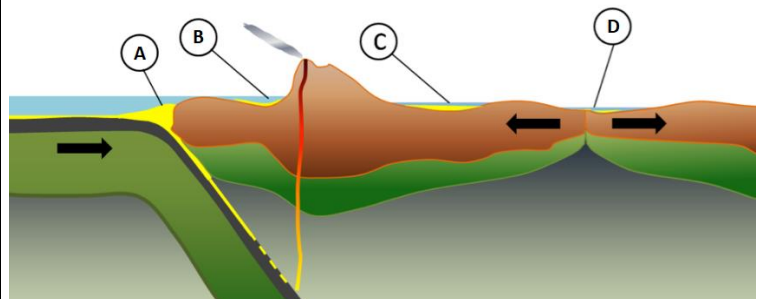
63. When did this occur?

64. See picture in the answer sheet. If the shaded box is “**Rifting within a continent splits a continent**” in the Wilson Cycle, fill the empty boxes with the corresponding letter to complete the cycle

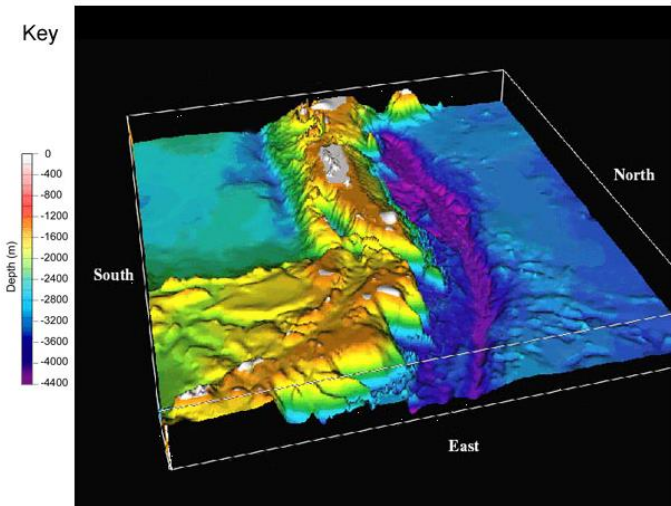
- A. Continent erodes, thinning the crust
- B. Terrance accretion – from the sedimentary accretionary wedge or fragments carried from the subducting plate – welds material to the continent
- C. Leads to the opening of a new ocean basin and creation of new oceanic crust
- D. As continents collide, orogeny thickens the crust and builds mountains, forming a new supercontinent
- E. As spreading continues and an ocean opens, passive margin cooling occurs and sediment accumulates during seafloor spreading
- F. Convergence begins, an oceanic plate subducts beneath a continental plate, creating a volcanic chain at the active margin

65. A large area of continent consists of 30 km of crust with density 2.8 Mg/m^3 over 90km of material with density 3.1 Mg/m^3 . This region is covered with a 1.6 km thickness of ice of density 0.9 Mg/m^3 . The asthenosphere density is 3.2 Mg/m^3 . The ice-covered region is assumed to be isostatic equilibrium. Then, the ice melts. By how much in km will the rock surface of the continent rise/drop when the new isostatic equilibrium is re-established?

66. Name the basins in the answer sheet for the features labeled in the picture

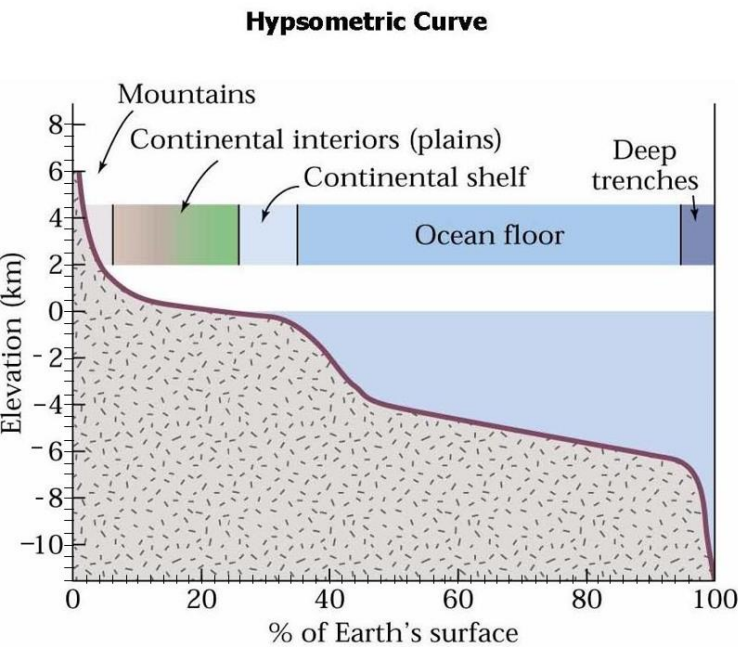


This bathymetric image shows a portion of the seafloor.
Provide answers and draw on the answer sheet:



67. The topography of the seafloor indicates the presence of a plate boundary. What type of plate boundary is this?
68. Draw a line to show the boundary.
69. Which plate is being subducted? Draw a polygon to show the plate.
70. What kind of plate is it? Why?
71. What is the type of the other over-riding plate? Why?
72. How did the island chain form?

Using the hypsometric curve below, answer the following questions:



73. Determine the minimum elevation of mountains that make up the highest 10% of the Earth's surface.
74. Most plants cannot exist above 4 km above sea level. What percent of the Earth's surface is higher than this?
75. Determine the percentage of the Earth's surface between 5 km below sea level and 1 km below sea level

----- **END** -----